

Beamline 12-ID / BESSRC-CAT

Scientific focus: Materials science, atomic physics, and geoscience

Scientific programs: Materials science (elastic and inelastic scattering, MOCVD, x-ray standing waves, electrochemistry), geoscience (mineral–liquid interface characterization), chemistry (small-angle scattering), and atomic physics (spectroscopy)

Optics & Optical Performance

- BESSRC standard monochromator
 - Si(111) crystal
 - 3–27 keV energy range
 - 35 mm offset
 - liquid-nitrogen cooling
 - 2nd crystal: Cu braid, liquid nitrogen cooling
 - UHV vacuum compatibility
- flat focusing monochromatic mirror
 - 40 m from source
 - Pt, Pd, and SiO₂ coatings
 - 2.5–4 mrad incident angle
 - ~100 μm focus in 12-ID-B

Experiment Stations

12-ID-A

- white beam first optics enclosure
- monochromator
- quad photodiode
- monochromator pinhole apertures

12-ID-B

- spectroscopy
- elastic and inelastic scattering
- reflectivity
- small-angle scattering

12-ID-C

- atomic physics
- small-angle scattering (low Q)

12-ID-D

- MOCVD chamber
- surface chamber
- x-ray scattering

Detectors

- ionization chambers
- Bicron
- solid-state detectors
- single-element Si and Ge
- Canberra 9-element Ge
- 2-D proportional wire detector
- gold CCD camera

Beamline Controls and Data Acquisition

12-ID-B

- Linux workstation running SPEC, Windows NT
- MacOS running EPICS applications

12-ID-C

- Linux workstation running SPEC, Windows NT
- MacOS running EPICS applications
- Sun Workstations for SAXS data acquisition and analysis

12-ID-D

- Linux workstation running SPEC (non-EPICS version) and EPICS applications

Beamline Support Equipment/Facilities

12-ID-B

- Huber 8-circle goniometer
- spectroscopy
- optics table
- small-angle scattering instrumentation

12-ID-D

- 6-circle goniometer
- surface chamber
- MOCVD apparatus

Insertion Device Source Characteristics (nominal)

source	Undulator A
period	3.30 cm
length	2.47 m
effective K _{max} (at minimum gap = 10.5 mm)	2.78
energy range 1st harmonic	2.9 - 13.0 keV
energy range 1st - 5th harmonics	2.9 - 45.0 keV
on-axis peak brilliance at 6.5 keV	9.6 x 10 ¹⁸ ph/sec/mrad ² /mm ² /0.1% bw
source size at 8.0 keV Σ_x	359 μm
	21 μm
source divergence at 8.0 keV Σ_x'	24 μrad
	6.9 μrad